Computation of element diffusion in non-LTE stellar atmosphere models

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The Tübingen model atmosphere program `PRO2` in its standard form approximates stellar atmospheres as plane parallel, chemically homogeneous atmospheres in radiative and hydrostatic equilibrium. Together with the solution of rate equations in full non-LTE for sophisticated atomic data this makes `PRO2` especially suitable for application to hot compact stars. Several extensions to this concept have recently been or are currently being implemented (see talks and posters by Werner, Nagel, Dreizler, Deetjen.) This poster presents the modifications made to correctly describe the chemically stratified atmospheres of hot white dwarfs and possibly sdB stars. In these stars, a large fraction of all heavy elements has disappeared from the outer layers due to gravitational sedimentation (Schatzman 1949). Traces of metals may however be sustained by radiative levitation provided the radiation field is intense enough to supply substantial momentum transfer. The radiative acceleration is excerted on trace elements by a non-LTE radiation field through the element's local opactity and therefore can vary strongly with depth. Balancing the radiative acceleration and the effective gravitational acceleration (including the effects of the electrical field that builds up through diffusion of electrons) yields an equilibrium condition for each atomic species (see e.g. Chayer et al. 1995). Its solutions yields equilibrium abundances, but as these also determine the opacity there exist s a intimate coupling to the radiative acceleration. Therefore the whole system has to be solved self-consistently, which is done here by iteration (Dreizler 1999). Presented below are some results of such calculations which have been sucessfully used to reproduce the observed EUV spectra of a sample of hot DA white dwarfs (Dreizler & Wolff 1999; Schuh 2000; Schuh et al. 2001a,b,c).

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